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**Method for operating a tool shaft**

The invention relates to a method for operation of a tool shaft with the aid of a sensor element of a sensor, in particular of an injection-molding or die-casting tool, in which the cavity has at least one associated sensor, for example for determination of a tool internal pressure and the sensor element is inserted into a sleeve with play.

**PRIOR ART**

Sensors for an indefinitely large number of technical fields are known from the prior art, where they are used to measure physical variables. The measured physical variables may, for example, be input parameters for a controller which, in particular, accompanies and controls a production process. By way of example, it is thus possible to monitor the physical characteristics of an element to be produced during production and, if necessary, to modify appropriate parameters. For this purpose, the sensors may be in contact with the element to be produced or with the material forming the element. In order to avoid measurement corruption, the sensors should record only those variables which are intended to be determined.

In this case, by way of example, the monitoring of the tool internal pressure in injection-molding and die-casting tools is cited from the large number of fields of application. The determination of the tool internal pressure

makes it possible, inter alia, to determine the time for switching from the filling pressure to the subsequent pressure.

A method for automatic identification of the sensitivity of sensors is known from DE 101 17 000 A1. The sensitivity of the sensors is determined, and a resistor is used to associate it with a specific sensor group with a predetermined sensitivity range. Once it has been selected, this sensitivity range can no longer be changed. However, when the sensor is inserted into a hole, it is possible, depending on the quality of this hole, for the sensor to touch the internal wall of the hole. This force secondary-path effect can result in the sensor losing sensitivity, which necessitates tedious recalibration of the measurement system.

Something similar is also known from US-A-5,427,516. In this case as well, the complete sensor comprises a sleeve in which a sensor head is arranged, with there being clearance between the sensor head and the sleeve. This sensor is then inserted into the wall of an injection-molding or die-casting tool, and is then calibrated.

#### **OBJECT**

The object of the present invention is to prevent the force secondary-path effect, in order to maintain the selected sensitivity of the sensor even in holes of lesser quality.

**AMENDED SHEET**

**ACHIEVEMENT OF THE OBJECT**

In order to achieve the object, the sensor is then calibrated, thereupon after determination of the sensitivity, a correspondingly codeable component, for example a resistor, is selected, is fitted in the sensor, and the sensor is inserted with the sleeve into the hole in a tool wall.

This method according to the invention has the major advantage that no force secondary-path effect occurs in which the sensor element touches the tool internal wall, in consequence significantly adversely affecting or entirely losing its sensitivity. The quality of the hole in the tool wall can now be ignored. The only important factor is the quality of the hole in the sleeve. However, it is cheaper and easier to produce a high-quality hole in the sleeve than to produce such a hole in the tool wall. Normally, the production of high-quality holes can be left to the manufacturer of these sensor sleeves.

At this point, play also includes guides for the sensor element, which guide the sensor element with respect to the internal wall of the sleeve without friction or with virtually no friction on, for example, sliding aids and/or rollers at specific points. However, the nature of the connection to the sensor element must ensure that no force secondary path can be formed, for example by elastic suspension of the sliding aids with respect to the sensor element. Such devices could be advantageous, for example as a support for long sensor elements.

The arrangement of a sleeve in the hole in which the sensor element is guided with play shields the sensor element from the internal wall of the hole. The quality of the hole